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Functional Product Business Models: A Review of the Literature and Identification of Operational Tactical Practices

Wiebke Reim[a,*], David Rönnberg Sjödin[a], Vinit Parida[ab], Andreas Persson[c]

[a]*Entrepreneurship and Innovation, Luleå University of Technology, 97187 Luleå, Sweden*
[b]*Department of Management, University of Vaasa, Vaasa, Finland*
[c]*Customer Solutions, Volvo Construction Equipment, Eskilstuna, Sweden*

* Corresponding author. Tel.: +46-920-492079. *E-mail address:* wiebke.reim@ltu.se

Abstract

Offering functional products (FP) are beginning to emerge as a growing trend within industrial firms driven by the desire to achieve economic performance and sustainable resource management goals. Nevertheless, our knowledge about how companies can adopt and implement FP has remained limited. In this study, we conduct a systematic literature review related to FP business models and tactical practices to advance the understanding regarding FP implementation. Based on the in-depth analysis of 48 articles, we develop a framework that proposes a link between FP business models and tactics. We further link FP business models to five operational level tactics, which can ensure the degree of their implementation and value generation. The identified tactical sets are contract, marketing, network, product design, and sustainability aspects.

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1. Introduction

Companies are increasingly offering integrated product and services offering in order to secure their future competitive advantage [1, 2].Although a promising and growing research stream has begun to emerge, the knowledge about how companies can adopt and implement integrated solutions is still very limited [3]. In particular, little is known about the transition towards offering higher value-adding functional products (FP) business models and successful implementation for competitiveness. As such FP primarily relate to the industrial product-service business models that are result oriented [4]. Offering of FP are largely related to business to business (B2B) settings rather than business to customer (B2C) settings and often includes retained ownership and complete responsibility of the product for the provider. Well-known industrial examples include Rolls-Royce in the aero-space industry, offering a range of services under the label of total care, and Bosch Rexroth in the industrial hydraulics industry offering availability of torque. Both of these examples are FP illustrate complex solutions consisting of hardware, service, software and management of operations [5].

Even through FP represents a potential path for a more sustainable resource management and utilization, the empirical development suggests that application of FP imposes challenges and requires radical transformations at company, value chain and industrial levels [6, 7]. In an attempt to understand and bring clarity regarding FP strategy implementation, we have focused our study on business

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models as this may represent the differentiating factor between successful and unsuccessful FP application. Essentially, the company's business model explains the design or architecture of the value creation, delivery and capturing mechanisms. This means every company, explicitly or implicitly, employs a particular business model [8]. Hence, FP strategy implementation in a company's operations goes along with new business model creation or existing business model modifications [9]. However, as business models are not well defined and to a large extent vaguely discussed within FP literature [3], we aim to specifically focus on business model research.

An FP implementation process starts with FP business model creation, but insights about underlying foundations for creating a competitive FP business model are a largely neglected research area [2,10]. Thus, besides FP strategy implementation and business models, we also focus on different operational practices that are employed by companies in order to maximize value and revenue creation through the chosen business model. These practices can be regarded as tactics or tactical sets, defined as the residual choices that can be adapted after choosing a business model or during the business model application, and have to fit to the company's operations [11,12]. A structured aggregation of tactics within FP literature can assist and facilitate companies to successfully implement FP, starting with effective business model creation.

With this background, in this study we aim to conduct a systematic literature review related to FP business models and tactical practices to advance the understanding regarding FP implementation. By fulfilling the stated purpose, we are able to explain how FP can be adopted and implemented at a strategic level through careful consideration of business models and at an operational level through employing tactical sets that can create and extract value.

2. Methodology

The purpose of a systematic literature review is to identify the existing body of literature within a specific area and to analyse and interpret the collected information. The phenomenon of interest in this case is the increased provision of FP by manufacturing firms. To find the relevant articles, the keywords for the literature search were based on the various literature streams that have evolved around this topic. Besides functional products the terms functional product development, product-service systems (PSS), industrial product-service systems (IPS²), service-dominant logic, servitization, servicification, integrated product service engineering, functional sales, service infusion, integrated product service offering and service transition have been used as keywords. The Scopus database has been used and the search has been limited to journal articles because they can be considered validated knowledge. The abstracts of 482 articles that resulted from the initial search have been read to check their relevance. During the review of all abstracts, the articles that were related explicitly or implicitly to FP or result-oriented product-services as well as business models have been selected for the literature review. This resulted in 34 articles selected for a fulltext review.

The cited references in the articles were used as a secondary source of literature. This results in 14 additional articles that have been included because they added valuable knowledge around the topic of interest. Thus, this systematic literature review is based on 48 articles with a specific focus on implementing FP business models and tactics. For the analysis of these articles, an open coding content analysis technique was employed. Using this technique, notes and headings are written in the text based on their association with the research focus. While inductively reviewing the studies, we also acknowledged that each study can contribute to several different headings. Thereafter, all headings were collected on a coding sheet and categories were generated. Through open coding, the main themes were discussed in relation to operational tactical sets for different FP business implementation models*.

3. Findings from the Literature Review

The purpose of this study is to advance the understanding regarding FP implementation by companies through a systematic literature review related to FP business models and tactical practices. To analyse the findings from the literature review and to fulfil the stated purpose, we are inspired by the generic competitive process framework as proposed by Casadesus-Masanell and Ricart [11]. This logic guides us by structuring and discussing the state of the art of FP implementation by linking business models and tactics (see Fig. 1). This means that based on the company's strategy to implement FP, decisions are taken by companies regarding the potential business models that they would apply [11]. But even when the company has decided on a specific business model, not all choices are clearly deduced. Casadesus-Masanell and Ricart [11] propose that these choices need to also incorporate operational-level tactics or tactical sets defined as the residual choices open to a company after choosing its business model. Tactics play an important role in how much value a company can create and capture through its strategy and business models. Thus, we find this framework to be suitable for structuring and visualizing how the literature review results on business models and tactics are related to FP implementation.

3.1. Functional Product Business Model

Although previous studies have acknowledged the importance of FP implementation [3,10], only a few studies explain the mechanism of how such intent can lead to competitiveness. When companies pursue FP implementation strategies they add service elements to their operations in different ways, resulting in different outcomes. This explains why certain companies are more successful with FP while others fail, even though they adopt a similar FP strategy. Following the study of Casadesus-Masanell and Ricart [11], we argue that the selection of a business model is one key

* The whole list of the references that have been included in the literature review can be obtained from the authors.

choice driving the fulfilment of a company's differentiation strategy. Indeed, recent FP studies highlighted that business models are central to successful FP application [2,13].

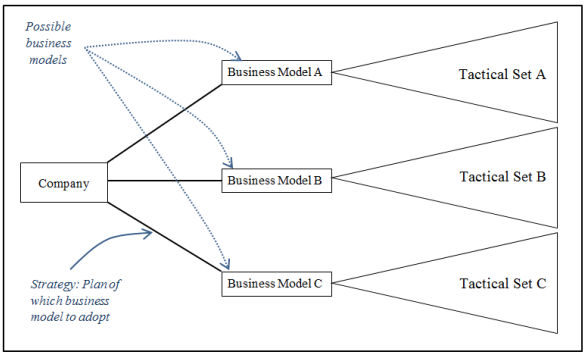

Fig. 1. The relationship between business models and tactics (based on [11])

The business model as a concept has been part of the business jargon for a long time but has only been pursued critically in management research during the last decade. To date there is no widely accepted definition of business models and they are often studied without being explicitly defined. However, a common argument in the literature states that the business model refers to the logic of the company, how it operates and how it creates value for stakeholders. Within FP literature, business models have been often mentioned or discussed. Our literature review reveals that 48 articles explicitly or implicitly cover discussion on FP business models. However, only a handful of studies clearly define the term 'business model'. Based on critical consideration of these related but diverse views on the definition of business models, we have adopted an inclusive definition for our study based on [8], which states that business models describe the design or architecture of the value creation, delivery and capturing mechanisms it employs. One example of an FP business model identified from the literature review is Ng et al.'s [14] study of service contracts that ensure the availability of certain defence equipment. Another example is the study done by Stoughton and Votta [15] on chemical management systems, where the provider is responsible for material handling at the customer's place.

3.2. Functional Product Tactics

Tactics are the residual choices at operational level that the company has after deciding which business model to apply. In this way, a company's business model will determine the range of tactics available to it and this will be different for each business model [11]. In contrast to business models that describe how the value is created, tactics are central to how much value is created and captured. Studies in FP literature also use the term 'tactics' to describe decisions that improve the amount of value created after choosing a particular business model [12]. In the following text, we will present five tactics related to the areas contracts, marketing, network, product design, and sustainability, which have been widely discussed in literature on FP business models.

3.2.1 Contract

Contracts define the responsibilities both parties have during a specific contractual period, such as between an FP provider and its customer. An FP contract is designed to cover all aspects that are related to the service provision and to clearly state the rights and liabilities of everyone involved. In contrast to selling pure products, the complexity of the contract increases significantly and the terms of agreement must be adapted accordingly [16]. The long-term relationship between provider and customer based on an FP contract is crucial and therefore needs to be handled carefully to balance the interest of both parties. It is important to establish incentives in order to reduce adverse behaviour [10]. FP literature also indicates the importance of a careful risk assessment and compensating the risk-bearing party in a suitable way. Richter and Steven [16] perceive FP contracts as they represent and implement the particular business model [16]. The formulation of the contract has a major impact on the value creation and revenue generation of the specific business model. In order to maximize the captured value of the FP offer it is essential to align the business model to contract-related aspects, such as responsibility and terms of agreement, formalization and complexity, as well as incentives and risk level. These aspects are derived from the literature review and elaborated in the following.

The first aspect, responsibility and terms of agreement, considers how tasks are divided between the contract parties and which terms are necessary to clarify rights and liabilities also from a legal perspective. In FP business models the provider will have complete responsibility for delivering the agreed result [3]. Because of this high responsibility, the terms of agreement become extremely important and the focus should be on carefully and accurately developed terms. This implies not only increased responsibility, but also a greater need for information exchange. Because this information can be sensitive, it is important to agree upon how information will be handled and the contract is very suitable for stating what is agreed upon.

The level of formalization and complexity will in general be affected as the service component increases. For FP business models the level of complexity is very high because results need to be delivered with their own specifications. Also, the closer the relationship the provider has with the customer, the higher the complexity. It can even be helpful to have multiple contracts to reduce the complexity of the agreement under such conditions [10].

The third aspect is related to incentives and risk level in contracts. Generally, incentives are included in the contract to ensure contract fulfilment, but this is also related to which risks are related to the contract and who is bearing those risks. Contracts usually have the purpose of mitigating risks. This is similar to insurance as a risk premium is given to the risk-bearing party [1,3]. The risks are based on the level of services that is provided; accordingly incentives or compensation have to be established for bearing certain risks. In the case of FP business models where the contract is based on the provision of the result, risks are mainly based on the delivery of the result following the terms of agreement. The provider has total responsibility and therefore also bears

higher risks related to the result completion. Only those manufacturers that are willing to sustain high risk premiums offer this type of service. The customer benefits from the reduced effort required to reach a certain result. Moreover, they need to put an emphasis on good relations with customers to improve the outcomes of contracts for FP business models [1].

3.2.2 Marketing

The differentiation strategy that is pursued with an FP application will have important implications for the marketing activities performed by the company [9,13]. While competing with low-cost producers, the service offer is a very important method of non-price marketing to attract customers [9]. Besides the importance of the service offer, many authors stress that the long-term relationship that is related to FP application has a significant impact on customer loyalty. This tighter relationship ensures increased insight into the customer's operations as well as their needs and preferences. Such customer insights are extremely valuable for the development of new FP offers [1,10]. The increased level of customer interaction means that FP-related marketing activities are very different from traditional marketing. We have identified three aspects from the literature that are essential in FP application.

The first aspect is the communication of value, which refers to the path through which the FP provider chooses to differentiate their product from those of competitors. For FP business models, communication of value is based on the fact that customers will have fewer tasks to perform on their own and will rather get the results delivered.

The second aspect is the extent of interaction with the customers, which is generally increased with the FP offer. The level of interaction is very high for FP business models due to continuous contact between FP provider and its customers. As the provider becomes fully responsible for the delivery of the result, any divergence from the expected result needs to be immediately mitigated. This requires close relationships, where trust between the actors involved is necessary for this specific business model to work [13].

The third aspect, customer and market insights, considers the increased possibility of collecting customer data through the increased interaction with the customer. This implies that the insights will increase with the level of interaction, explained in the previous section. A lot of benefits can be gained through FP business models where the speed of innovation increases radically due to the comprehensive data available as a result of close interaction with customers [10].

3.2.3 Network

The provision of services adds several new tasks to the operations of the manufacturing company. These tasks cannot be performed by the company independently and therefore it is necessary to develop networks and infrastructures [15]. Network in this setting describes the relation and interaction with all stakeholders, e.g. customers, dealers and suppliers. This new situation of closer collaboration makes the partner selection very important and the company needs to deal with the new challenges as the business model is transformed towards FP [2]. The company must also be willing to work with unfamiliar prospective partners. This can be challenging but necessary for FP implementation [12]. However, it is not only about whom to collaborate with but also about the type of collaboration, which can differ significantly based on the services offered [9]. After having chosen the partners for collaboration and the level of interaction, a lot of effort is needed in order to develop ways to coordinate activities and to share the right information efficiently in the network. In such networks, service provision takes a central role and close collaboration with various partners will raise new requirements for the company. From the literature review, three common aspects – namely, type of partner, type of relationship and sharing and coordination activities – are identified as most characteristic of FP networks.

The first aspect, type of partner, can vary significantly based on the service that is provided, but some general reflections can be proposed. In FP business models the network structure changes significantly. The service provision is quite close to vertical integration and direct contact with the customer is crucial. Besides the close collaboration with the customer, other stakeholders can be involved to handle required tasks, such as financial institutions, or recycling or transportation companies [10].

The second aspect is about the type of relationship. This needs to be carefully considered because the interaction with partners can have different intensities, but for the service provision it is important to find the most suitable level of interaction. For FP business models the main focus is on the direct interaction with the customers. These services should only be offered to trusted and key customers that have existing relations with the company. This also limits the number of potential customers for such offers and makes close collaboration feasible [15]. Because such business models are solution-oriented, the individual systems of both partners need to be adapted to each other to reduce ineffectiveness and the connection to the customer's value chain needs to be well managed [9,14]. In order to maximize the value creation from the partnership, the customer should be treated as an innovator by emphasizing the co-creation process. Possible other network partners should support the interaction with the customer in order to secure successful service provision.

The third aspect about sharing and coordination activities deals with the importance of efficient information sharing between the network partners. The number of customers is quite low in the case of FP business models and the communication between the partners will be more personal in nature. On one hand, this may lead to trust building, but on the other hand it also creates additional requirements for task coordination. The new working routines have to be communicated proactively and responsibilities need to be clarified. This solution-oriented partnership integrates two different operational systems and therefore communication and coordination need to be handled very carefully [13,15].

3.2.4 Product Design

The product requirements change along with the various types of service provision as companies offer FP solutions. To

meet these new requirements, product design needs special emphasis to meet the service offer characteristics. Several preferable product properties, like easy to maintain, upgrade and reuse, can be identified, which will increase the value creation of the FP business model [17]. A closer and long-term relationship with customers may also favour or require a product design that is adapted to special customer needs, which adds further complexity to the service provision [10]. In the literature on FP business models several case studies, but also conceptual papers, highlight the importance of an adapted product design where the whole life cycle of the product is considered [17]. From this literature two major aspects can be identified that place different requirements on the product, namely functionality and customization.

The functionality aspect considers how the product should be designed to fit the offered service in the best way. The opportunities for functionality are unlimited in the case of FP business models because no specific product is related to the service and any product can be designed that best fits the requirements of the agreed service. However, this flexibility may necessitate significant changes in the service provision processes, as well as in the production processes [3,10].

The second aspect, customization, describes how much the products will be adapted to the needs of the individual customers. FP business models will always require a higher degree of customization because the service is integrated with the customer's operations. Therefore, the product design has to be adapted to their special needs. This leaves room for innovations which would benefit not only the provider and the customer but even the society [1].

3.2.5 Sustainability

Reaching sustainability is one of the main objectives of FP application. The potential improvements can be very different but usually result in either increased resource utilization or innovations that make the production process more sustainable. But sustainable improvements do not occur automatically in the context of FP application. Companies need to actively strive for the utilization of the potential for more sustainability [1]. Legal and market drivers are an important instrument to motivate companies to endeavour towards utilization of the full FP offer potential in terms of sustainability [12]. From the literature review it was found that the main aspects considered were improved resource utilization and the extent of innovation. In the following, we discuss these in relation to value creation and generation.

The resource utilization aspect is related to the fact that the offered services will improve efficiency as well as reduce the number of products that are in use. FP business models are solution-oriented and the ways to provide the agreed service will be adapted to the customer needs. The incentives for the provider to improve resource utilization are extremely high because the savings will directly benefit the manufacturer [1].

The second aspect about the extent of innovation considers whether incremental or radical innovations are suitable to improve sustainability. Radical innovations where novel ways of function fulfilment are established are possible outcomes of FP business models. This is the case because provider and customer agree on a result and no particular product is considered for the fulfilment. This gives the manufacturer the incentive to try out totally new ways of operation which at the same time create incentives for better resource utilization for improved sustainability [12].

4. Conclusion

This study was initiated with the aim of conducting a systematic literature review related to FP business models and tactical practices to advance the understanding regarding FP implementation. Even though we found an increased number of publications about the phenomenon of companies offering result-oriented functional products, critical discussion on FP implementation has remained limited. This is mainly because most companies find it challenging to transform their traditionally used business models into FP business models. Thus, we not only propose the business model as a differentiating factor for successful and unsuccessful FP application, but also as a central starting point for FP implementation transition.

Besides the business model that concerns how the value is created, delivered and captured, operational tactics are also a necessary component to consider for implementation. We were able to identify 48 articles related to business models and tactics; still we found limited discussion on how they relate to each other. Thus, we contribute to FP literature by providing valuable insights into the relation between business models and tactical practices that could lead to a structured and thoughtful FP implementation process.

Based on the literature review we identified five tactical sets which elucidate the competitive choices enabled by each business model. The most critical tactics for FP application that have been identified in the literature review are contracts, marketing, network, product design and sustainability (see Table 1).

In further developing the discussion on FP implementation based on the logic proposed by Casadesus-Masanell and Ricart [11], we also identify key aspects of each discussed tactic. These aspects are related to the tactics and can be used flexibly based on the FP business model. Moreover, we acknowledge that FP implementation may require creative usage of different aspects related to tactics. For example, each company may decide to employ tactics according to their strategic choice of business models. Thus, we argue that through identification and discussion of several empirically rooted examples of tactics and their related aspects guidance to companies in the process of FP implementation can be gained.

While the systematization of the literature on FP business models and tactics makes significant contributions to this emerging research field, it also acknowledges potential paths for future research. First, the tactics identified in the present study do not represent a complete list of tactics but are instead prominent tactics identified based on the undertaken systematic literature review. Future research efforts should address the tactics that influence business model implementation by composing a comprehensive list of tactics that organizations evaluate. Second, tactics can have different effects when employed jointly. Further research is needed to

exploit how tactics enhance or suppress each other's effects on FP business model implementation. Prior studies have not undertaken a specific focus on this interaction effect among the five tactics. Third, relationship between tactics and business models need further examination. Tactics are mentioned frequently in the literature, but their impact on how much value is created is rarely discussed. Seeking further clarity about such relationships is important for understanding the micro-foundation for successful PSS business model implementation. Finally, more quantitative studies are needed to empirically examine different business models and test their influence on company performance and growth. Moreover, by introducing the moderating effect of the proposed tactics, it is possible to understand more about the conditions under which certain business model categories influence company performance.

Table 1. Functional Product Tactics and Aspects.

Tactic	Aspect	Specification
Contract	Responsibility and terms of agreement	- responsibility for result - agreement focus on characteristics of the result
	Formalization and complexity	- formalization: low - complexity: high
	Incentives and risk level	- incentives: less work for customer, higher revenue for provider
Marketing	Communication of value	- task and responsibility reduction on customer side - environmental and social benefits
	Customer interaction	- close relation - trust building
	Customer and market insights	- comprehensive data collection - increased speed of innovation
Network	Type of partner	- direct contact with customer - some tasks can be done by third-party providers
	Type of relationship	- focus on co-creation - close to vertical integration - based on trust
	Sharing and coordination activities	- much personal communication - implement new working routines
Product Design	Functionality	- unlimited opportunities - high flexibility
	Customization	- high degree of customization
Sustain-ability	Improved resource utilization	- high incentives for provider to improve resource utilization
	Extent of innovation	- radical innovations can lead to significant sustainability effects

We believe that the systematization of the literature on FP business models and tactics makes significant contributions to the emerging research field. This study has made an initial attempt to systematize research on FP business models and tactics. However, like any other study we would like to acknowledge certain limitations, which should be considered while evaluating the results. First, we have been careful to capture articles that discuss the transition of companies from being product-oriented to product-service-oriented through the use of several well-established keywords. However, there may be other keywords, which we have not considered in the present study. Second, we only focused on articles related to functional products and excluded articles that only studied services that are mainly product or use oriented. Finally, we have only used one database for the review, which may have implications for our results. However, we believe that our study has made a considerable contribution on developing a discussion that guides both practitioners and researchers interested in the accumulated knowledge about FP implementation.

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